Multi-standard, Multi-format Portable Waveform Monitors

▶ **WFM5000 • WFM4000**

The WFM5000 and WFM4000 Portable Video Waveform Monitors provide an ideal solution for basic video and audio monitoring needs with an integrated LCD high-brightness display in a convenient 3RU half-rack short depth form-factor, suitable for space-constrained environments.

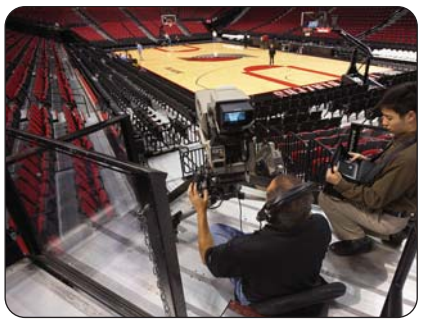
These versatile instruments provide options to accept power from a 12 VDC source, a battery or a 100-240 VAC converter.

Both models come standard with support for 16 channels of Embedded Audio and 1 input for 2 channels of Digital AES audio.

WFM5000
Supports HD-SDI (SMPTE 292M) and SD-SDI (ITU-R BT.601) monitoring applications. It provides HD/SD format autodetect.

WFM4000
Supports SD-SDI (ITU-R BT.601) monitoring only.

These instruments provide the reliability of the Tektronix waveform monitors family in a portable, basic monitoring product.



Tektronix Excellence

WFM5000 and WFM4000 offer uncompromised monitoring quality with sharp CRT-like traces, patented Gamut displays, Picture thumbnail, Display freeze and an Error log for 10,000 events for efficient content compliance verification.

Digital Audio and Video Monitoring in One Instrument
These instruments provide standard digital audio monitoring with Audio Bars, Lissajous Displays and Front panel headphone port for easy compliance verification of digital Audio without the need for an additional piece of equipment.

▶ Features & Benefits

WFM5000 — HD/SD-SDI Portable Waveform Monitor

WFM4000 — SD-SDI Portable Waveform Monitor

Convenient, 3 RU, Half-rack, Short-depth Instrument, Ideal for Space-constrained Environments

AC and DC Power Options

Patented Gamut Displays Facilitate Compliance Verification

The Sharpest CRT-like Waveform Trace Quality

Error Log for 10,000 Events Simplifies Error Correction Tasks

Fully Digital Processing for Accurate, Repeatable, Drift-free Operation

Ethernet Port Allows for Easy Download of Screen Shots and Error Log

Freeze Mode for Trace and Picture Displays

Equipped Standard with Monitoring Capacity for 16-channels of Embedded Audio (up to 8 Simultaneously) and 1 AES Audio Input

Front Panel Headphone Port for Easy Monitoring of Audio Channels

Audio Bars and Lissajous Displays for Verification of Audio on the Same Instrument

32 User-configurable Presets for Quick Recall of Commonly Used Configurations

User-definable Safe Area Graticules Facilitate Editing Tasks

High-brightness Display Allows for Indoor and Outdoor Usage

Picture Thumbnail with Line-select Marker

Intuitive User Interface, Backlit Buttons and Online Help

Front Panel USB Port for Easy Transfer of Instrument Presets

▶ Applications

Confidence Monitoring Of SDI Video and Uncompressed Digital Audio

Compliance Checking in Distribution and Broadcast

Content QA in Production and Post-production

Portable Monitoring on Camera and Field Production

Tektronix
Enabling Innovation

Ease of Use

The Intuitive User Interface provides backlit buttons and online help.

32 user-configurable presets allow users to recall commonly used configurations tailored to your personal work practices. These presets can be transferred to and from other units (same model) via the front panel USB port.

The Passive loop-through inputs allow for transparent monitoring at any point of the signal path even if instrument power is off.

An Ethernet port allows for easy download of Screen shots and the Error log.

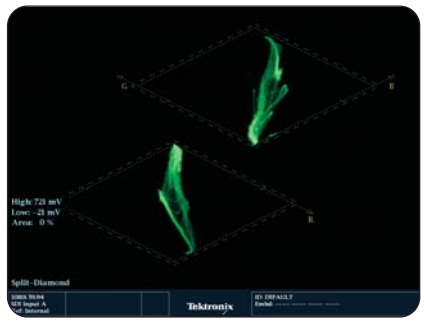
See and Solve with Tektronix Displays

The **See and Solve** displays in Tektronix video monitors simplify video monitoring tasks such as calibration, error detection and content correction allowing to detect errors at a glance and troubleshoot them efficiently.

Tektronix displays offer the sharpest CRT-like trace quality for clear waveform monitoring with the look and feel of an analog display. With several sweep rates and easy control of vertical gain and horizontal magnification, you can efficiently monitor and measure video waveform parameters.

Specialized displays provide summarized, yet comprehensive reports of alarms, session and status of content. Powerful displays such as Video Status show in a condensed way error statistics, signal format, presence of ancillary data and more. These Tektronix exclusive displays simplify monitoring tasks by providing important content information at a glance.

The vector display offers user-selectable graticules, color target and color axis.

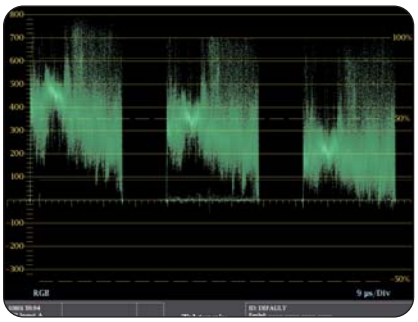


Patented Tektronix Gamut Displays — Efficiently Detect and Correct Gamut Problems

The patented Tektronix Diamond and Split Diamond displays enable Colorists, Editors and Operators to visualize whether the content is RGB Gamut-compliant with a single glance. Plus, they are designed to help isolate the Out-of-Gamut component just as easily.

For SDI component content that is destined for broadcast in composite systems, the unique Tektronix Arrowhead display can be used to monitor Composite Gamut compliance without the need for a separate encoder. Within this display, a separate upper and lower luma-only Gamut limit can be applied. This display is very useful for camera balancing.

Each of these displays offers user-selectable Gamut thresholds so Operators can set monitoring limits appropriate to their specific operation. In addition, Gamut monitoring is fully integrated with the powerful alarm logging and reporting capability of the WFM5000 and WFM4000.



Sharp Waveform Display — CRT-like Trace Quality

A complete range of display options lets users choose between parade and overlay presentation of SDI signals in RGB, YPbPr, YRGB or pseudo-composite formats.

Full horizontal timing flexibility is provided with 1Line, 2Line, 1Field and 2Field sweep modes, with or without magnification.

Both fixed and variable vertical gains are offered, each with the outstanding accuracy and repeatability that comes from a fully digital design.

The Line Select provides a line marker in full screen and thumbnail picture modes.

Vector Display

The vector display is offered with selectable 75% and 100% targets.

Each display automatically selects the appropriate graticule based on the input format.

Picture Display — Quick Visual Confirmation and Precision Content Adjustment

For a qualitative view of the content, a full-color picture display is offered, which can be displayed as a full-screen presentation. This display is compatible with all input formats and features automatic adjustment for aspect ratio and number of active lines.

You can select **brightup** conditions that show the location of RGB or composite gamut errors on the picture display. The line-select mode shows the location of the line currently selected within the picture display.

Users can choose from several **Safe Action** and **Safe Title** graticules on the picture display which help Editors and Operators easily identify incorrectly positioned video content such as graphics, titles or logos.

Graticule choices include the Safe Action and Safe Title graticules defined in SMPTE RP218, ITU and ARIB standards, plus two sets of totally flexible, user-definable graticules.

These graticules facilitate editing tasks and reduce the need for format conversions.

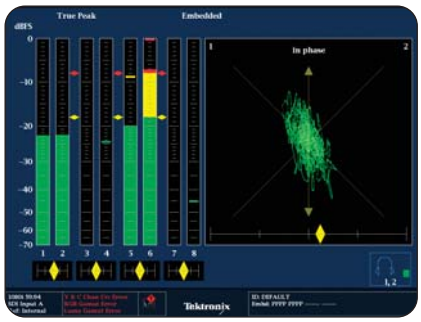
Alarms, Quality Statistics and Logging — Thorough and Fast Content Verification

The WFM5000 and WFM4000 offer a variety of displays designed to show status at a glance, in addition to the status bar continually displayed at the bottom of the screen.

A comprehensive overview of the video content status is presented in the Video Session display. Offering a time-based compilation of information, this screen is ideal for presenting evidence of compliance after content screening. Information on input format and session time is presented, along with statistics on Error Detection and Handling (EDH)/Cyclic Redundancy Check (CRC) and Gamut errors.

The Alarm Status display, provides continuous information on the state of each condition currently being monitored by the instrument.

To support unattended monitoring applications, as well as provide documentation for service level agreements, these instruments maintain an error log of 10,000 events, which facilitates the detection and correction of problems. Log entries are recorded with date, time-of-day and time code (VITC, LTC, ANC). The error log can be downloaded to TXT or HTM formats for easy record keeping and processing on spreadsheets or database software.



Digital Audio Capabilities — Equipped Standard

Audio monitoring capabilities for both digital AES and Embedded audio are available as standard in the WFM5000 and WFM4000.

The instruments feature Level Bars display and both Bars and Lissajous display. These displays can be selected to provide monitoring for both embedded and AES digital audio formats with up to eight channels (2 channels for AES Audio).

The level meters offer selectable meter ballistics and scaling plus they are user-configurable. The over and silence settings augment digital clip and mute detection by letting users select levels to represent these conditions in the analog audio domain.

The Audio Session display records the highest true peak, as well as the number of mutes, clips, overs and silences during the session time. Tektronix instruments provide accurate peak level measurements.

▸ Characteristics

Video Input and External Reference Formats

The WFM5000 and WFM4000 Waveform Monitors accept a wide variety of input signal formats and external references. The following chart illustrates all the video inputs (first column), cross referenced with their compatible external references.

Supported Input Formats	External Reference Inputs									
	NTSC	PAL		720p		1080p/sF		1080i		
	59.94 Hz	50 Hz	50 Hz	59.94 Hz	60 Hz	23.98 Hz	24 Hz	50 Hz	59.94 Hz	60 Hz
483i, 59.94 Hz (525), BT601*2	X			X					X	
576i, 50 Hz (625), BT601*2		X	X					X		
720p, 23.98 Hz*3	X			X		X			X	
720p, 24 Hz*3					X		X			X
720p, 25 Hz*3		X	X					X		
720p, 29.97 Hz*3	X			X					X	
720p, 30 Hz*3					X					X
720p, 50 Hz*3		X	X					X		
720p, 59.94 Hz*3	X			X		X			X	
720p, 60 Hz*3					X		X			X
1035i, 59.94 Hz*3	X			X					X	
1035i, 60 Hz*3					X		X			X
1080i, 50 Hz*3		X	X					X		
1080i, 59.94 Hz*3	X			X					X	
1080i, 60 Hz*3					X		X			X
1080p, 23.98 Hz*3	X			X		X			X	
1080p, 24 Hz*3					X		X			X
1080p, 25 Hz*3		X	X					X		
1080p, 29.97 Hz*3	X			X					X	
1080p, 30 Hz*3					X					X
1080sf, 23.98 Hz*3	X			X		X			X	
1080sf, 24 Hz*3					X		X			X
1080sf, 25 Hz*3		X	X					X		
1080sf, 29.97 Hz*3	X			X					X	
1080sf, 30 Hz*3					X					X

*2 Available with the WFM5000 and WFM4000.

*3 Available with the WFM5000 only.

The monitor will automatically detect the signal format and establish the appropriate settings for the various displays. You can select an expected signal format from the list of supported formats. If the expected format and detected format differ, the instrument will report a format mismatch.
The instrument will signal a format mismatch if the applied external reference format is not compatible with the input signal.

▸ Serial Digital Video Interface

Inputs	2, only one active at a time
	For WFM5000, the inputs autodetect between HD and SD signals
Input Type	Passive loopthrough BNC, 75 Ω compensated
Input Level	800 mVp-p, ±10%
Return Loss	≥25 dB from 1 MHz to 270 MHz, power on
	≥15 dB from 1 MHz to 270 MHz, power off
	>15 dB from 1 MHz to 1.5 GHz, power on or off
Loopthrough Insertion Loss	For HD, equivalent to 10 m of type 8281 cable
Loopthrough Isolation	>50 dB to 300 MHz
Receiver Equalization Range	Typically for SD, to 250 m of type 8281 cable; for HD to 100 m of type 8281 cable

▸ External Reference

Sync Formats	NTSC and PAL and tri-level sync
Input Type	Passive loopthrough BNC, 75 Ω compensated
DC Input Impedance	20 kΩ, nominal
Return Loss	>40 dB to 6 MHz
	>35 dB to 30 MHz
Lock Range	±50 ppm

▸ Serial Digital Waveform Vertical Characteristics

Vertical Measurement Accuracy	At x1 gain, ±0.5% of 700 mV full scale; at 5x gain, ±0.2% of 700 mV full scale
Gain	1x, 5x, variable range 0.25x to >7.5x
Frequency Response	
SD	Luminance (Y) channel ±0.5% to 5.75 MHz, Color Difference channels (Pb, Pr) ±0.5% to 2.75 MHz
HD	Luminance (Y) channel ±0.5% to 30 MHz, Color Difference channels (Pb, Pr) ±0.5% to 15 MHz

▸ Waveform Horizontal Deflection

Sweep Timing Accuracy	±0.1%
Sweep Linearity	±0.1%
Audio Characteristics	
Level Meter Resolution	0.056 dB steps at 30 dB scale from full scale to –20 dBFS; 0.20 dB steps at 70 dB scale for signals above –20 dBFS
Meter Ballistics	True peak, PPM type 1, PPM type 2, BBC PPM, extended VU
Defined/Programmable Level Detection	Mute, clip, user programmable silence, over
Level Meter Accuracy Over Frequency	–0.5 dB (for analog), –0.2 dB (for digital) from 20 Hz to 20 kHz, 0 to –40 dBFS sine wave, Peak Ballistic mode
AES Inputs	1 set of 2 channels, 32 kHz, 44.1 kHz, 48 kHz, 96 kHz, 192 kHz, 24 bit
AES Input Characteristics	BNC, 75 Ω terminated, unbalanced, 0.2 V to 2 Vp-p
AES Input Return Loss	>30 dB relative to 75 Ω from 0.1 to 6 MHz

Power

► 12 VDC In

► Power adapter accepts 100 to 240 VAC –10%, 50/60 Hz

Input Voltage	
Voltage Range	12 to 15 VDC nominal
	10.75 to 18 VDC min to max operating
Supply Connection	XLR 4 pin male connector
	Pin 1 = V(–)
	Pin 4 = V(+)
	Pin 2,3 NC
Power Consumption	22 W typical
	30 W max
Surge	6 amps at 12 V
Fuse Rating	4 amp internal self-resetting fuse
Transient, Over and Reverse	Reverse and over voltage protected to ±30 VDC
Voltage Protection	The unit may power itself down in the presence of high transient voltages. This prevents damage to the unit and is not a failure

► Physical Characteristics

Dimensions	cm	in.
Height	13.208 cm.	5.2 in.
Width	21.336 cm.	8.4 in.
Depth (front to back including handles and BNCs)	13.97 cm.	5.5 in.

Weight	kg	lbs.
Net	1.56 kg.	3 lbs. 7 oz.

▸ Ordering Information

WFM5000

Waveform Monitors with support for HD-SDI and SD-SDI Serial Digital Monitoring (2 passive loopthrough inputs).

Digital audio monitoring in embedded (16 channels) and AES/EBU (2 channels) formats.

Uses same physical inputs for HD and SD —autodetect between HD and SD.

Please specify Power Option when ordering.

WFM4000

Waveform Monitors with support for SD-SDI Serial Digital Monitoring (2 passive loopthrough inputs).

Digital audio monitoring in embedded (16 channels) and AES/EBU (2 channels) formats.

Please specify Power Option when ordering.

▸ Power Options

AC-DC Power Adapter	
Opt. A0	North America
Opt. A1	Universal EURO
Opt. A2	United Kingdom
Opt. A3	Australia
Opt. A5	Switzerland
Opt. A6	Japan
Opt. A10	China
Opt. A11	India
Opt. A99	No AC-DC Power Adapter

▸ Accessories

Description	Rackmount Accessories for WFM5000 / WFM4000
Cabinet Accessories	
Portable Cabinet	WFM50F01
Soft Carrying Case to accompany the WFM Series Portable Cabinet	WFM50FSC (WFM50F01 is required)
Dual Rack Cabinet for two WFM5000 / WFM4000	WFM50F02
Dual Rack Cabinet	
WFM5000 & WFM7000 Series	WFM50F03
WFM4000 & WFM6000 Series	WFM50F03
Filler Panel for Dual Rack Cabinet	WFM50F06
Drawer for Dual Rack Cabinet	WFM50F07
Battery Accessories	
Battery Adapter Plate (Anton Bauer Gold-Mount)	WFM50FGM
Battery Adapter Plate (Sony / IDX V-Mount)	WFM50FVM
Other Optional Accessories	
12V DC Anton Bauer Battery	146-0156-00
12V DC Anton Bauer Battery Charger	016-2005-00

Service Options

C3 – Calibration Service 3 Years.
C5 – Calibration Service 5 Years.
D1 – Calibration Data Report.
D3 – Calibration Report 3 Years (with C3).
D5 – Calibration Report 5 Years (with C5).
R3 – Repair Service 3 Years (including warranty).
R5 – Repair Service 5 Years (including warranty).
CA1 – Provides a single calibration event or coverage for the designated calibration interval, whichever comes first.
R1PW – Repair Service Coverage 1 Year post warranty.
R2PW – Repair Service Coverage 2 Years post warranty.
R3DW – Repair Service Coverage 3 Years (includes product warranty period) starts at the time of customer instrument purchase.
R5DW – Repair Service Coverage 5 Years (includes product warranty period) starts at the time of customer instrument purchase.

User Manual CD in English, Simplified Chinese and Japanese is supplied with the instrument.

Multi-standard, Multi-format Portable Waveform Monitors

▶ **WFM5000 • WFM4000**

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Updated 12 November 2007

For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit **www.tektronix.com**

Product(s) are manufactured in ISO registered facilities.

Product(s) complies with IEEE Standard 488.1-1987, RS-232-C and with Tektronix Standard Codes and Formats.

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01/08 HB/WOW 2PW-21468-0

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Enabling Innovation